

WHAT IS CLAIMED:

1. An image forming apparatus, comprising:

a latent image carrier configured to carry a latent image on a surface of the latent image carrier while moving;

a charging member configured to uniformly charge the surface of the latent image carrier, the charging member being one of in contact with and adjacent to the surface of the latent image carrier;

a conductive brush member including a brush configured to remove foreign substances from the surface of the charging member;

a developing device configured to develop the latent image carried on the surface of the latent image carrier with toner, the developing device comprising:

a developer carrier configured to carry a developer including the toner on a surface of the developer carrier while moving; and

a casing configured to accommodate the developer carrier, the casing having an opening exposing a portion of the developer carrier, and having an edge portion adjoining the opening, the surface of the developer carrier exposed through the opening of the casing facing the surface of the latent image carrier in a developing region;

a developer scatter preventing member configured to prevent the developer from scattering, comprising:

a first end portion fixed to the edge portion of the casing;

a second end portion flexed on an upstream side of the developing region in a moving direction of the surface of the latent image carrier,

wherein a gap between the edge portion of the casing and the surface of the latent image carrier is blocked by bringing the second end portion of the developer scatter preventing member into contact with the surface of the latent image carrier, and

wherein a contact pressure of the second end portion of the developer scatter preventing member relative to the surface of the latent image carrier is set such that a brush portion, which falls from the conductive brush member and is carried on the surface of the latent image carrier, passes through a contact part between the second end portion of the developer scatter preventing member and the surface of the latent image carrier.

2. The image forming apparatus according to claim 1, wherein a thickness of the developer scatter preventing member is in a range of about 0.05 mm to about 0.15 mm.

3. The image forming apparatus according to claim 1, further comprising a toner accumulation preventing member configured to prevent the toner from accumulating,

wherein the toner accumulation preventing member is disposed between the developer scatter preventing member and the developer carrier such that the developer carried on the surface of the developer carrier contacts at least a portion of the toner accumulation preventing member by the time the developer is conveyed to the developing region by movement of the surface of the developer carrier.

4. The image forming apparatus according to claim 3, wherein a thickness of the toner accumulation preventing member is in a range of about 0.05 mm to about 0.15 mm.

5. The image forming apparatus according to claim 3, wherein the toner accumulation preventing member is disposed such that a first end portion of the toner accumulation preventing member and the second end portion of the developer scatter preventing member are located at substantially same relative positions with respect to the developing region.

6. The image forming apparatus according to claim 3, wherein the toner accumulation preventing member is disposed such that a first end portion of the toner accumulation preventing member is positioned closer to the developing region than the second end portion of the developer scatter preventing member.

7. The image forming apparatus according to claim 3,  
wherein the developer comprises a two-component developer including toner and magnetic carrier,

wherein the developer carrier includes at least one magnetic field generating device, and the two-component developer rises on the surface of the developer carrier in a form of a magnetic brush by action of a magnetic field generated by the at least one magnetic field generating device such that the two-component developer contacts the surface of the latent image carrier in the developing region, and

wherein at least one of the developer scatter preventing member and the toner accumulation preventing member is disposed at a position where at least one of the

second end portion of the developer scatter preventing member and the first end portion of the toner accumulation preventing member does not contact the two-component developer that rises on the surface of the developer carrier in the form of the magnetic brush in the developing region.

8. The image forming apparatus according to claim 1, wherein the brush of the conductive brush member includes filaments, and wherein a diameter of each of the filaments is in a range of about 1 denier to about 20 denier, a length of each of the filaments is in a range of about 0.3 mm to about 2.5 mm, and a density of the filaments is in a range of about 7,000 filaments/cm<sup>2</sup> to about 46,000 filaments/cm<sup>2</sup>.

9. An image forming apparatus, comprising:

a latent image carrier configured to carry a latent image on a surface of the latent image carrier;

a charging member configured to uniformly charge the surface of the latent image carrier, the charging member being one of in contact with and adjacent to the surface of the latent image carrier;

a conductive brush member including a brush configured to remove foreign substances from the surface of the charging member;

a developing device configured to develop the latent image carried on the surface of the latent image carrier with toner, the developing device comprising:

a developer carrier configured to carry a two-component developer including the toner and magnetic carrier on a surface of the developer carrier and disposed opposite to the surface of the latent image carrier, the developer

carrier including a rotary non-magnetic sleeve, and at least one magnetic field generating device having a main magnetic pole provided inside of the sleeve;

a casing configured to accommodate the developer carrier, the casing having an opening exposing a portion of the developer carrier, and having an edge portion adjoining the opening, the developer carried on the surface of the developer carrier being conveyed to the opening of the casing, and the main magnetic pole causing the developer to deposit and rise on the surface of the developer carrier in a form of a magnetic brush at the opening of the casing, such that the toner in the magnetic brush is supplied to the latent image carried on the surface of the latent image carrier;

a developer scatter preventing member configured to prevent the developer from scattering, the developer scatter preventing member being disposed at the opening of the casing on an upstream side of a region where the magnetic brush is rises on the surface of the developer carrier in a direction of conveying the developer on the surface of the developer carrier such that a leading edge of the developer scatter preventing member contacts the surface of the latent image carrier; and

a toner accumulation preventing member configured to prevent the toner from accumulating, the toner accumulation preventing member being disposed between the surface of the developer carrier and the developer scatter preventing member,

wherein the at least one magnetic field generating device further includes adjoining auxiliary magnetic poles disposed upstream and downstream of the main magnetic pole in the direction of conveying the developer, respectively, to adjust a half-width of the main magnetic pole, and

wherein the main magnetic pole has an angular width of about 60 degrees or less between opposite pole transition points respectively positioned upstream and

downstream of a flux density of the main magnetic pole in the normal direction in the direction of conveying the developer.

10. The image forming apparatus according to claim 9, wherein the toner accumulation preventing member is disposed such that a leading edge of the toner accumulation preventing member is closer to the region where the magnetic brush is rises on the surface of the developer carrier than the leading edge of the developer scatter preventing member by about 0 mm to about 2 mm.

11. The image forming apparatus according to claim 9, wherein the main magnetic pole is positioned at an angle of about 3 degrees to about 9 degrees upstream of the position where the latent image carrier and the developer carrier are closest to each other in the direction of conveying the developer.

12. The image forming apparatus according to claim 9, wherein a surface of the toner accumulation preventing member facing the developer carrier is rubbed against a magnetic brush that rises by the auxiliary magnetic pole disposed upstream of the main magnetic pole in the direction of conveying the developer, and the magnetic brush deposited on the surface of the developer carrier lies at the respective leading edges of the developer scatter preventing member and the toner accumulation preventing member.

13. The image forming apparatus according to claim 9, wherein the developer scatter preventing member and the toner accumulation preventing member are disposed at positions where the respective leading edges of the developer scatter

preventing member and the toner accumulation preventing member do not contact the magnetic brush that rises on the surface of the developer carrier by action of the main magnetic pole.

14. The image forming apparatus according to claim 9, wherein the brush of the conductive brush member includes filaments, and wherein a diameter of each of the filaments is in a range of about 1 denier to about 20 denier, a length of each of the filaments is in a range of about 0.3 mm to about 2.5 mm, and a density of the filaments is in a range of about 7,000 filaments/cm<sup>2</sup> to about 46,000 filaments/cm<sup>2</sup>.

15. An image forming apparatus, comprising:

means for carrying a latent image on a surface of the means for carrying a latent image while moving;

means for uniformly charging the surface of the means for carrying a latent image

means for removing foreign substances from the surface of the means for charging;

means for developing the latent image carried on the surface of the means for carrying a latent image with toner, the means for developing comprising:

means for carrying a developer including the toner on a surface of the

means for carrying a developer while moving; and

means for accommodating the means for carrying a developer,

means for preventing the developer from scattering, comprising:

a first end portion fixed to an edge portion of the means for accommodating; and

a second end portion flexed on an upstream side of the developing region, in a moving direction of the surface of the means for carrying a latent image,

wherein a gap between the edge portion of the means for accommodating and the surface of the means for carrying a latent image is blocked by bringing the second end portion of the means for preventing the developer from scattering into contact with the surface of the means for carrying a latent image, and

wherein a contact pressure of the second end portion of the means for preventing the developer from scattering relative to the surface of the means for carrying a latent image is set such that a brush portion, which falls from the means for removing foreign substances and is carried on the surface of the means for carrying a latent image, passes through a contact part between the second end portion of the means for preventing the developer from scattering and the surface of the means for carrying a latent image.

16. The image forming apparatus according to claim 15, further comprising:  
means for preventing toner from accumulating,

wherein the developer carried on the surface of the means for carrying a developer contacts at least a portion of the means for preventing toner from accumulating by the time the developer is conveyed to the developing region by movement of the surface of the means for carrying a developer.

17. An image forming apparatus, comprising:

means for carrying a latent image on a surface of the means for carrying a latent image;



means for uniformly charging the surface of the means for carrying a latent image;

means for removing foreign substances from the surface of the means for charging;

means for developing the latent image carried on the surface of the means for carrying a latent image with toner, the means for developing comprising:

means for carrying a two-component developer including the toner and magnetic carrier on a surface of the means for carrying a two-component developer, the means for carrying a two-component developer including means for generating a magnetic field having a main magnetic pole;

means for accommodating the means for carrying a developer, the developer carried on the surface of the means for carrying a two-component developer being conveyed to an opening of the means for accommodating, and the main magnetic pole causing the developer to deposit and rise on the surface of the means for carrying a two-component developer in a form of a magnetic brush at the opening of the means for accommodating, such that the toner in the magnetic brush is supplied to the latent image carried on the surface of the means for carrying a latent image;

means for preventing the developer from scattering, the means for preventing the developer from scattering being disposed at the opening of the means for accommodating on an upstream side of a region where the magnetic brush rises on the surface of the means for carrying a two-component developer in a direction of conveying the developer on the surface of the means for carrying a two-component developer; and

means for preventing the toner from accumulating, the means for preventing the toner from accumulating being disposed between the surface of the means for carrying a two-component developer and the means for preventing the developer from scattering,

wherein the means for generating a magnetic field further includes adjoining auxiliary magnetic poles to adjust a half-width of the main magnetic pole, and

wherein the main magnetic pole has an angular width of about 60 degrees or less between opposite pole transition points respectively positioned upstream and downstream of a flux density of the main magnetic pole in the normal direction in the direction of conveying the developer.

18. An image forming apparatus, comprising:

a latent image carrier configured to carry a latent image on a surface of the latent image carrier while moving;

a charging member configured to uniformly charge the surface of the latent image carrier, the charging member being one of in contact with and adjacent to the surface of the latent image carrier;

a conductive brush member including a brush configured to remove foreign substances from the surface of the charging member;

a developing device configured to develop the latent image carried on the surface of the latent image carrier with toner, the developing device comprising:

a developer carrier configured to carry a developer including the toner on a surface of the developer carrier while moving; and

a casing configured to accommodate the developer carrier, the casing having an opening exposing a portion of the developer carrier, and having an

edge portion adjoining the opening, the surface of the developer carrier exposed through the opening of the casing facing the surface of the latent image carrier in a developing region;

first and second means for preventing the developer from scattering, the first means preventing the developer from scattering in a direction conveying the developer, at a position on an upstream side of the developing region where the developer carrier faces the latent image carrier, and the second means preventing accumulation of the developer on a surface of the first means facing the developer carrier.

19. The image forming apparatus according to claim 18, wherein the brush of the conductive brush member includes filaments, and wherein a diameter of each of the filaments is in a range of 1 denier to 20 denier, a length of each of the filaments is in a range of 0.3 mm to 2.5 mm, and a density of the filaments is in a range of 7,000 filaments/cm<sup>2</sup> to 46,000 filaments/cm<sup>2</sup>.

20. An image forming apparatus, comprising:

a latent image carrier configured to carry a latent image on a surface of the latent image carrier;

a charging member configured to uniformly charge the surface of the latent image carrier, the charging member being adjacent to the surface of the latent image carrier;

a conductive brush member including a brush configured to remove foreign substances from the surface of the charging member;

a developing device configured to develop the latent image carried on the surface of the latent image carrier with toner, the developing device comprising:

a developer carrier configured to carry a two-component developer including the toner and magnetic carrier on a surface of the developer carrier and disposed opposite to the surface of the latent image carrier, the developer carrier including a rotary non-magnetic sleeve, and at least one magnetic field generating device having a main magnetic pole provided inside of the sleeve;

a casing configured to accommodate the developer carrier, the casing having an opening exposing a portion of the developer carrier, and having an edge portion adjoining the opening, the developer carried on the surface of the developer carrier being conveyed to the opening of the casing and the main magnetic pole causing the developer to deposit and rise on the surface of the developer carrier in a form of a magnetic brush at the opening of the casing, such that the toner in the magnetic brush is supplied to the latent image carried on the surface of the latent image carrier;

first and second means for preventing the developer from scattering, the first means preventing the developer from scattering in a direction conveying the developer carrier, at a position on an upstream side of the developing region where the developer carrier faces the latent image carrier, and the second means preventing accumulation of the developer on a surface of the first means facing the developer carrier;

wherein the at least one magnetic field generating device further includes adjoining auxiliary magnetic poles disposed upstream and downstream of the main magnetic pole in the direction of conveying the developer, respectively, to adjust a half-width of the main magnetic pole, and

wherein the main magnetic pole has an angular width of 60 degrees or less between opposite pole transition points respectively positioned upstream and downstream of a flux density of the main magnetic pole in the normal direction in the direction of conveying the developer.